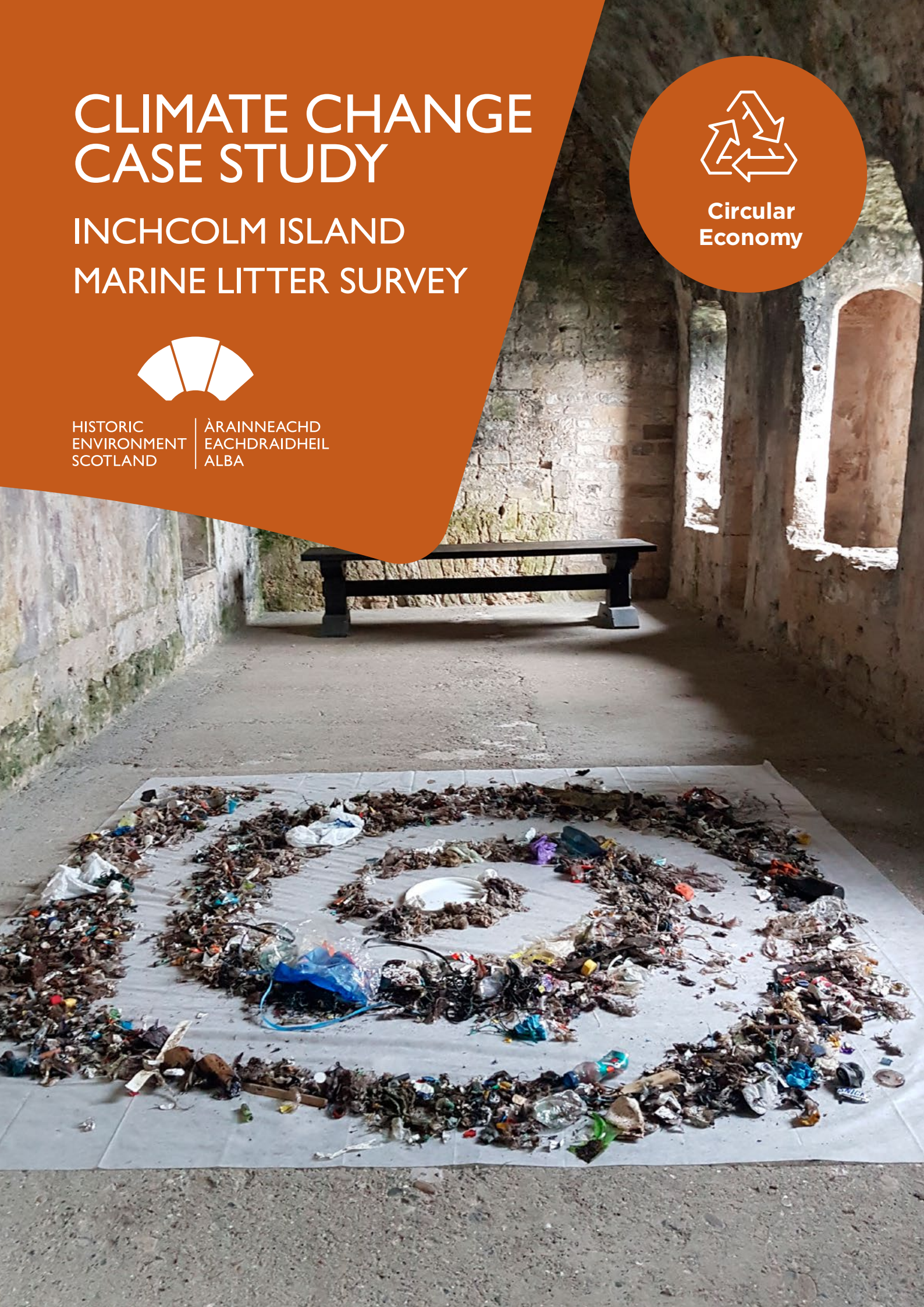
CLIMATE CHANGE CASE STUDY

INCHCOLM ISLAND MARINE LITTER SURVEY

Circular Economy

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA



INTRODUCTION

Litter causes significant damage to our natural environments as well as preventing access and enjoyment of the historic environment. At Historic Environment Scotland (HES), we are committed to tackling litter pollution of all kinds and contributing to a litter-free Scotland.

Marine litter is causing a global environmental crisis. The United Nations has stated that marine life is facing irreparable damage from the millions of tonnes of plastic waste which ends up in the oceans each year. It is estimated that there are over 150 million tonnes of plastic in the world's oceans, and every year, one million birds and over 100,000 sea mammals die from eating and getting tangled in plastic waste.[1]

Marine litter is a common sight on Inchcolm Island in the Firth of Forth, just a short boat ride away from Edinburgh (Fig. 1). The island is under the care of HES and home to Inchcolm Abbey and the best-preserved group of monastic buildings in Scotland, along with remains of coastal defences from the two world wars. It is home to just two people, who work at the Abbey for seven months of the year. During this time, it is visited by day-trippers via a ferry from South Queensferry or by private boat or kayak. As a result, there is very little waste generated on the island itself. Litter found on the site is primarily from marine sources washing ashore.

During the summer of 2019, 41kg of litter was surveyed and cleared from a beach on Inchcolm Island. This case study takes a look at what kind of litter was washing ashore on the island, giving an insight into the types of marine litter found in our Scottish seas as well as the observed effects this litter has on wildlife. It forms part of our work to tackle litter at its source by developing a better understanding of the types of litter found in our oceans.

[1] Estimates by Department of Environment, Food and Rural Affairs (Defra).

Key findings

- 41kg of marine litter was surveyed in a 6-month period, amounting to 7,018 individual pieces.
- The main material found was plastic.
- Cotton bud stems and wet wipes, items often flushed down the toilet, were two of the most commonly found recognisable items.
- Plastic wrappers and bags were the second most commonly found items and were observed being eaten by seagulls and found within their pellets.
- Litter is continually washing up onto the beach surveyed, averaging around 8.5kg each month.
- 99% of marine litter surveyed came from household items, originating from land-based sources.

Fig. 1: Aerial view of Inchcolm Island.

SCOPE OF THE SURVEY

Survey dates: May-September 2019

Watercourse: Firth of Forth

Survey area: South Beach

OS grid reference: NT189827

Between May and September 2019, two staff based at Inchcolm undertook periodic surveys and clearances of marine litter on South Beach, Inchcolm Island.

Fig. 2: Nesting Eider on Inchcolm Island.

The survey area: South Beach

The area surveyed was the entire length of the South Beach on Inchcolm Island. This beach is a large particle sand beach nestled between rocks at either side of the bay. It appears to look clear at a glance, but the amount of microplastic pollution on the sands is evident with closer examination. There is a large quantity of rotting seaweed, vegetation and weeds that trap the plastics underneath when they are washed up on the beaches and blown about by the wind.

As with the rest of the island, this beach is a haven for birds such as seagulls and other marine birds, which are often seen feeding from the area (Fig. 2).

Method

The beach was cleared of the rotting seaweed and vegetation which traps the waste that is washed up on the beach. Rakes and garden forks were used to untangle the seaweed from the waste, which was bagged. The bagged waste was then classified and weighed (Figs. 3 and 4).

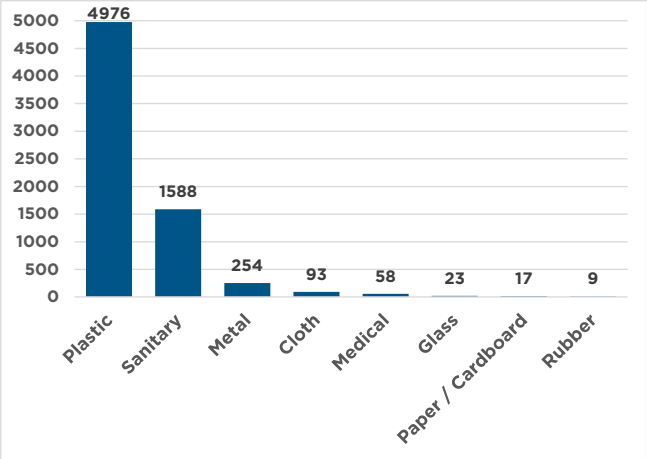
Fig. 3: Collection weighing and documentation of waste.

Fig. 4: The clean-up in action.

FINDINGS

The following chart and table show the types of waste collected from the South Beach during the 16 litter picks that took place from June to September 2019.

Types of waste collected from South Beach, June 2019



Top 5 items found

1. Plastic/polystyrene pieces 0–2.5cm – 2,229 items
2. Cotton bud sticks – 954 items
3. Small plastic bags (freezer or vegetable bags) – 950 items
4. Packets (crisps, sweets, sandwich) – 616 items
5. Wet wipes – 522 items

Table of waste collected from South Beach, June 2019

Type of waste	Amount
Plastic	
Plastic/polystyrene pieces 0-2.5cm	2,229
Bags: small	950
Packets (crisps/sweets/ sandwich)	616
Plastic/polystyrene pieces 0-2.5cm	483
Caps/lids	256
Gloves (industrial/professional)	104
Tangled net/cord/rope/string	75
Toys/party poppers/dummies	67
Bottles/containers - drinks	62
String/rope over 1cm thickness	55
Cutlery/straws	29
Foam/Sponge	24
Plastic/polystyrene pieces over 50cm	14
Shoes	6
Combs/hairbrushes/sunglasses	5
4/6 pack yokes	1
Rubber	
Balloons	9

Type of waste	Amount
Cloth	
Clothing	92
Sacking	1
Paper/Cardboard	
Cigarette stubs	17
Metal	
Foil wrapper	178
Scrap	53
Cans (drink)	21
Other (over 50cm rusted metal sheet)	2
Glass	
Bottles	23
Sanitary	
Cotton bud sticks	954
Wet wipes	522
Tampons and applicators	78
Other (dental floss sticks)	30
Toilet fresheners	3
Other (dentures)	1
Medical	
Containers/tubes	50
Syringes/needles	8

OBSERVATIONS

Plastic and polystyrene 0–2.5cm – 2,229 items

This category of material is made up of a combination of different plastics such as children's toys (Fig. 5), degraded pieces of plastic and unidentifiable plastics (Fig. 6). This makes up the greatest category, as a broad spectrum of items fall into this grouping. Due to the large amount of microplastics (some the size of a grain of sand, which, although they can be seen due to their colouring, cannot all be counted), the plastic and polystyrene 0–2.5cm category is an estimated value based on the lowest number of items collected and counted.

Along with the waste collected from the beach, the impact on the wildlife of Inchcolm has also been observed, with plastics found within seagull pellets and in the nests of both seagulls and Eider ducks. This type of plastic waste poses a particular threat to young sea birds that are unable to distinguish between food and waste. During one of the beach cleans, a young seagull chick was observed pecking at plastic. It is easy to see why a chick would confuse waste with food when you consider how the food colour blends in with the plastics (Fig. 7).

Cotton bud sticks – 954 items

On Inchcolm, the single most found item of a specific type are plastic cotton bud stems (Fig. 8). They also make up a significant proportion of sewage-related debris recorded from surveys of beach cleans across the country. In 2018 the Marine Conservation Society recorded that 22 cotton bud stems were found per every 100 metres of beach; this shows that Inchcolm is well above the UK average.

Cotton bud stems cause significant environmental harm, including to marine animals, as well as pollution. In their complete state they can pierce the internal organs of marine animals that may accidentally ingest them. These stems are generally made from polypropylene, so as they break down they become microplastics. As well as damaging the marine environment, there is an increasing risk to public health from these fragments of plastic entering the food chain.

Fig. 5: Pieces of children's toys, including balloon and plastic string.

Fig. 6: Unidentifiable plastic pieces.

Fig. 7: Bright crab surrounded by micro and degraded plastic waste.

Fig. 8: Collection of cotton bud stems.

Small plastic bags (freezer or vegetable bags) – 950 items

Small plastic bags, pieces of plastic bags and clingfilm type packaging is the third most common item found on the beach. In some instances it has broken up during collection creating more microplastic waste. It was not possible to distinguish whether any of these remnants were actually compostable packaging made from naturally derived materials. A plastic bag takes between ten and twenty years to fully degrade, while thicker food wrappings will take significantly longer.

This kind of plastic waste poses one of the biggest threats to the marine birds on Inchcolm. A number of seagull pellets (the waste they regurgitate) were found to contain plastic waste (Fig. 9).

Packets (crisps, sweets, sandwich) – 616 items

The UK consumes around 6 billion packets of crisps annually, plus 4.4 billion bags of other assorted savoury snacks. As crisp packets are made from two materials merged together, aluminium-coated polypropylene (PP) or polyethylene (PET), they are particularly hard to recycle. They turn up in large numbers on Scotland's beaches, and some have been identified as being decades old.

Crisp and snack packets are lightweight, so they can easily blow out of bins or, if they are littered, can blow into local watercourses and then make their way into the sea, where they are a danger to sea life. Wildlife can get entangled in the packets, and they also breakdown into microplastics, which can be consumed by wildlife.

Wet wipes – 522 items

Most wet wipes that are flushed down toilets contain non-biodegradable plastics such as polyester, which can take up to 100 years to degrade. Unflushables make up 8.5% of all beach litter, and this includes wet wipes.[2] When in the water, they stretch to become almost rope-like, becoming entangled in seaweed and endangering marine life. Unlike toilet paper, they do not break apart and are difficult to separate by hand. Recently, a seagull was witnessed at Inchcolm regurgitating a J-cloth, a material that has similar properties to wet wipes.

Fig. 9: Two types of plastic bag waste found in this seagull pellet found near South Beach.

Fig. 10: Cleared marine litter displayed at Inchcolm Abbey.

[2] The Marine Conservation Society, Stop the Unflushables.

CONCLUSION

Inchcolm makes for a unique case study to monitor marine litter washing up from the rivers and seas surrounding Edinburgh. The data gathered from the clean-ups has shown that plastic is the main pollutant threatening the Firth of Forth, with an overwhelming amount of small plastic pieces, small plastic bags and snack packets being found alongside sanitary items of cotton buds and wet wipes.

This study also shows that most of these products are everyday items that we use in our daily lives, and therefore are originating from land-based sources rather than coming from fishing boats or other marine sources. We can all do something to help reduce this kind of pollution by ensuring we are disposing of these items responsibly, by not flushing them away, recycling them where possilbe, and ensuring they do not end up being littered. Furthermore, taking steps to use fewer of these types of products and materials will also be a major first step towards turning the tide on marine litter.

OUR WORK

This work supports the wider objectives outlined in our HES Litter Prevention Action Plan, published in 2018. This plan sets out our approach to supporting Scotland's National Litter Strategy using the three themes of information, infrastructure and enforcement.

Authors:

Charlotte Golledge and Andrew Cuthbert
Former Stewards at Inchcolm Island

Edited by: Katie Carter, Circular Economy Project Officer

Fig. 11: South Beach following the clean-up and survey, clear of the vegetation and marine litter mix.

WANT TO KNOW MORE?

This case study forms part of a series of Climate Change Case Studies. It is part of our work to reduce our environmental impact as set out in our Climate Action Plan.

Our Climate Action Plan outlines how we intend to work towards making our organisation more prepared for, and resilient to, changes in our climate, while also playing a leading role in supporting the Scottish Government to meet its ambitious climate change targets.

To find out more about this and other Climate Change projects, please contact our team:

E: climatechange@hes.scot

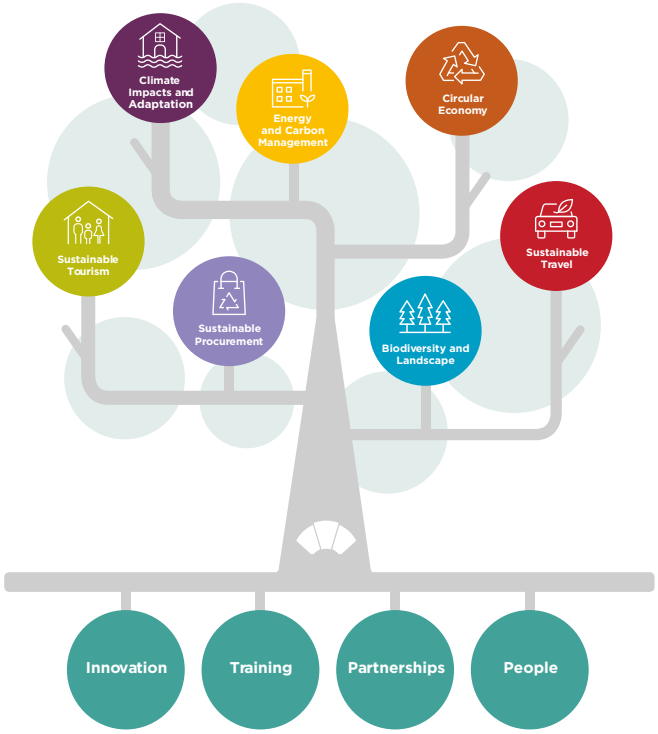


Fig. 12: HES Climate Action Plan themes.

HES RESOURCES

We have a variety of research, guidance and information covering a range of topics relating to the historic environment. These are all free to download from our website: Historic Environment Scotland publications. They include the following series:

INFORM Guides
Leaflets giving a brief introduction to over 50 subject areas of historic environment conservation, maintenance and repair.

Short Guides
Our Short Guides give a more detailed overview of best practice techniques when working with historic buildings. Topics include energy efficiency, repair and maintenance, climate change adaptation and micro-renewables.

Refurbishment Case Studies
This series details the findings from our on-site work trialling and testing techniques for the repair, maintenance and upgrading of traditionally constructed buildings and components. Topics include energy efficiency works, retrofitting, and techniques and materials.

Technical Papers
These papers cover the results of technical research carried out or commissioned by HES. They include topics such as thermal performance of traditional windows, U-values and traditional buildings, keeping warm in a cool house, and slim-profile double glazing.

Any enquiries regarding this document should be sent to us at:
Historic Environment Scotland
Longmore House
Salisbury Place
Edinburgh
EH9 1SH
T. 0131 668 8600
www.historicenvironment.scot

Scottish Charity No: SCO45925
VAT Number: GB 221 8680 15

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